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into the field of view, narrowly called physical chemistry, but more properly designated as *general* chemistry, because its principles do not lie apart, but are the substratum of all chemical phenomena, and it is by the reaction of this on the special provinces that their true progress will be maintained. Who shall share the honor of contributing to this progress? Who shall remain behind pondering over antiquated problems? Let me recall to your minds the tenacity with which Priestley held to the doctrine of phlogiston, the persistence with which Berzelius fought the theory of substitution, the satire of Liebig on the discovery of the yeast plant, and the sneers with which Kolbe greeted the first announcement of the laws of stereochemistry. There are not wanting to-day those who take a similar position towards the newer principles and theories of general chemistry. Some of us are comparatively young, and in sympathy with the spirit of the time, but if the genius of Berzelius and Kolbe did not prevent their final calling on the stream of progress to stop, how much more likely are we, as we grow older, to be found in a similar position if we once begin to yield to the spirit of indifference to that which does not most intimately concern us. As the truly scientific man is not he who limits his interest to a single province, but rather he who attempts to gain a rational comprehension of nature as a whole, so he only is truly a chemist in the highest sense of the word who is in sympathy with all branches of chemical investigation and with all progress, and who does not merely admit, with benevolent ignorance, but actually feels and sees that physical, inorganic, organic and physiological chemistry are not separate, but continuous with each other and with all nature. It is not enough that we occupy ourselves assiduously with researches in our chosen but often narrow field, if by

much peering through the microscope of science we become myopic towards nature in general. We must, to use Kolbe's expression, frequently mount our Pegasus and soar to the heights of the scientific Parnassus. It is not the men who spend their lives in studying single groups of compounds or single phenomena, with interest in nought else, but those like van't Hoff, Ostwald, Fischer, and Hantzsch, who keep their minds open to light from all sources not the conservatives, but the radicals, who are lifting organic chemistry above the old fashioned and still fashionable structurism, and bringing about what I have called its *revival*.

H. N. STOKES.

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THE WAIKURU, SERI AND YUMA LANGUAGES.

THE area of the tribes of the Yuman family was visited and crossed in the earliest epoch of American exploration. These Indians became known through their large numbers and the fine exterior of their bodies, but chiefly through their spirit of opposition to the white man's progress. Scientific exploration of their country, settlements and languages began about 1850 on the Colorado and Gila Rivers. The area inhabited by them soon appeared to be largely in excess of what it had been supposed to be; for from San Luis Rey, on the Pacific Ocean, their territorial boundary extended south of the Shoshonean family to the Tonto Basin, included the Maricopas on the Gila River down to the Cocopa country, and thence again ran to the ocean.

Jesuit missionaries began working in the peninsula of California about 1697, but never met with cordial receptivity among the natives. At the southern extremity dwelt the Pericú Indians; they lived, says Venegas, from Cape San Lucas northward, beyond the harbor of La Paz; for Padre Miguel del Barco, who wrote in 1783, says

that the Pericú tongue was spoken fifty leagues north of Cape San Lucas. They lived in small tribes, and the most noted of these were the Coras, once known as Edúes to the inhabitants of Loreto. Some writers classed them as Waikuru, and as the name Cora may be identical with kuru in Waikuru, it is quite possible that all or most of the Pericúes spoke Waikuru. Nothing of their language has reached us except the names of seven Pericú deities and a few local names (in Venegas, Gilij), all of which have a musical and vocalic sound.

Farther north, between 23° 30' and 26° lat., lived, or still live, the Waikuru Indians in small scattering bands. The more important of their tribal bodies were, from the names of their dialects, Loretano, Cora, Uchití, Aripe (Hervas). The Laimon, the 'gente del adentro,' spoke the dialect in use around the Loreto mission. About eighty words of their language have come to our knowledge, contained in the Lord's Prayer and church literature, which so far as they go show no affinity of decided character with the Yuman dialects spoken north of their settlements and on the mainland. The language is vocalic and sounds agreeably, but differs entirely in phonology, words, and grammar from Yuma, and has to be set down as a family by itself.

On the eastern side of the Gulf of California are settled a number of tribes with affinities heretofore subject to doubt, as the Guayma and Upanguayma, the Salineros, and the Cocomagues; also the Tepoka, who live opposite the large Island of Tiburón. They are grouped in the vicinity of the Seri, a wild and indomitable people who live partly in mainland Sonora and partly on their old home, Tiburón Island, frequently changing their abodes. At greater distances from the Seri dwell the Lower Pimas, the Pápagos, also the nearly extinct Ópatas.

From ancient reports we gather the notice that the Tepokas and Salineros speak Seri, from Orozco y Berra that Cocomagues speak Guayma or a dialect of it, and from Alphonse L. Pinart, who traveled there in 1879, that the Guayma then spoke a dialect of the Lower Pima.

The vocabulary of Seri obtained by A. L. Pinart shows many accumulations of consonants, some of them difficult for us to pronounce, and occurring mainly at the end of the vocables. In his collection the words seldom end in vowels, but in McGee's there are as many vowels as consonants in final sounds. Pinart found the utterance guttural, and compares it in this respect with the Santa Barbara or Chumashan dialects of the State of California. The guttural, lingual and labial articulation is prominent over the other classes of consonants.

As to the grammatic part of Seri speech, we record some prefixes and a number of suffixes in nouns and verbs, but since every collector writes them differently, we know little about their pronunciation and less still about their function. Suffixes of common occurrence are -em, -x'o, -ok (or -mok), -st, mostly appended to nouns. For the Cochimi, some inflections of the verb and other grammatic elements were transmitted, but for Seri and Waikuru these are absolutely wanting for the present, for all that we have is mere words. A close study of the compound words may ultimately disclose case-forms in the noun and personal inflection in the verb, but as we have no texts of Seri, it is doubtful that they will aid us much in bringing on a result. Mr. Hewitt has made a fair commencement in analyzing etymologically the numerals and other terms. Comparing the vocables is, therefore, the only means left to us at present to solve the question of affinity of Seri with the neighboring languages. The terms in which affinity with Yuman dialects is most probable, are:

Seri : avát, áv't—blood ; hwát in Yavapai.

hám̄t, amt, ampte—earth, soil ; amát in Cuchan.

ehe—tree, bush ; e—i in Cuchan.

ápis—tobacco ; ópi in Cocopa.

kakólz—large ; kaokó—o in Cochimi.

az, ache, ahj—water ; aha in Yavapai, and frequent in North American languages as ax, áha, etc.

A few more correspondences of this sort, especially expressing parts of the human and animal bodies, are found, but they are too weak in numbers and quality to prove anything against the overwhelming number of terms that show absolute disparity in Yuman dialects compared with Seri. The terminals of Yuma are more typically vocalic than those of Seri.

The possibility of Seri being of the same kin as the Nahuatl dialects spoken around it in the State of Sonora, viz, the Pima, Pápago, and Ópata, has been carefully considered by the noted Americanist, Professor J. E. Buschmann, member Royal Prussian Academy of Sciences (1854). The result was that no radical affinity existed between the two groups.

At present the chances stand entirely against genealogical affinity of Seri with Yuma ; but a final verdict can be rendered only after expert linguists have examined that language on the spot and obtained a lexicon and ethnographic texts in a way that will prove absolutely correct in their phonetics.

A. S. GATSCHE.

#### ON THE INFLECTION OF THE ANGLE OF THE JAW IN THE MARSUPIALIA.\*

THE posterior part of the jaw in the Marsupialia has been long recognized as peculiar in that the angle, instead of projecting vertically downwards, as is usually the case in

the Mammalia, is bent abruptly inwards so as to produce a horizontal shelf, thus giving the jaw, when viewed from the outside, the appearance of lacking an angle entirely, its arcuate lower border passing directly into the articular condyle.

With the object of ascertaining the cause of this condition, the writer has examined various mammalian jaws and also dissections and serial sections through the heads of the common opossum (*Didelphys marsupialis*) and the pouch young of the wallaby (*Macropus* sp.).

The opossum shows the following anatomical relations. The whole outer surface of the inflected angle is occupied by the outer fasciculus of the masseteric muscle, the entire inner surface by the pterygoideus internus. Both of these muscles are powerfully developed, while the pterygoideus externus is much reduced. The latter muscle is attached above the inflected angle. The inflection introduces three peculiar features: It increases abundantly the insertion area of the masseter and pterygoideus internus ; It places the latter muscle in opposition to the lateral traction of the masseter on a weak symphysis ; it renders the line of traction of the pterygoideus internus vertical, so that with a reduction of the pterygoideus externus there is scarcely any provision for transverse muscular motion and so for a sectorial or a grinding action of the teeth. Of these peculiarities the last is probably the only one of primary significance. It contrasts strongly with the usual condition in placental types.

Sections through the head of the developing wallaby show the cavity of inflection to be occupied by Meckel's cartilage. This seems to indicate that the inflection has originated by the disappearance of bony elements on the inside of the jaw and by the reduction of Meckel's cartilage. *The inflected portion represents primarily not an angle, but a part of the lower border of the jaw.*

\* Preliminary paper read before the American Association for the Advancement of Science, New York, June, 1900.